ANNEX ONE
TO THE
NONREIMBURSABLE UMBRELLA SPACE ACT AGREEMENT
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER
AND
UBER TECHNOLOGIES INC
FOR
INITIAL MODELING AND SIMULATIONS OF URBAN AIR MOBILITY OPERATIONS FOR AIRSPACE ACCESS AND SCALABILITY

ARTICLE 1. PURPOSE

This Annex shall be for the purpose of modeling an operational simulation of Urban Air Mobility (UAM) in the presence of other airspace users, including both conventional manned (piloted and human-directed) operations as well as existing and planned unmanned aircraft systems (UAS).

The overall objectives of the modeling and simulation assessments will be:

1. Conduct initial modeling of airspace operations to investigate how UAM operations will be accommodated in uncontrolled (e.g., Class G) and controlled airspace (e.g., Class B) in the presence of current manned operations. The modeling work will focus on potential interference effects from UAM operations integrated into current operational scenarios by evaluating if/how/where Traffic Collision Avoidance System (TCAS) alerts are triggered. A range of Uber operational scenarios will be evaluated with combinations of aircraft route, speed, altitude, and direction along the "DFW (Dallas/Fort Worth) spine route".

2. Conduct initial human-in-the-loop simulation studies (1-week simulation with 1-week cognitive walk-through prior to simulation) to investigate how high-density UAM operations can be conducted without impact (or with minimal impact to) ANSP workload in the presence of other manned and unmanned operations using a UTM-type construct in today's airspace. The goal of this simulation is to evaluate how well controllers can still maintain safe and efficient management of traditional aircraft during proposed UAM operations. This study will use a scripted scenario of well-orchestrated UAM operations from vertiport locations to vertiport locations in and near DFW. A test matrix will vary traditional traffic and UAM operational traffic in evaluations of how controllers react to scripted contingencies of UAM operations. Assessments of controller workload and acceptability of UAM operations will be conducted.

3. Collaborative publication of results from these studies.

The legal authority for this Annex, consistent with the Umbrella Agreement, is in accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113(e)).

ARTICLE 2. RESPONSIBILITIES

A. NASA ARC will use reasonable efforts to:

1. Use the NASA UTM prototype system in the evaluation of the proposed simulation studies.
2. Involve Uber Subject Matter Experts (SME's) during the NASA tests and evaluations conducted under this agreement.
3. Arrange for Dallas-Fort Worth air traffic SMEs to come to North Texas Research Station (NTX) if they are needed for cognitive walk-throughs of scenarios.
4. Conduct fast-time modeling using appropriate systems such as the Airspace Concept Exploration System (ACES) and NASA Testbed to evaluate UAM operations using NASA-obtained TCAS version 7.1 module.
5. Develop a Mishap Prevention Contingency Plan (MPCP) prior to any operations under this Agreement and lead in any investigation and safety review (in accordance with NPR 8621 and NPR 7900) in the case of an incident or mishap.
6. Provide NASA SMEs with appropriate operational and testing expertise.

B. Partner will use reasonable efforts to:

1. Provide detailed configuration and performance information (e.g., noise) for each vehicle to be considered for modeling and simulation. All data will be provided using a removable digital medium or within a printed document.
2. Provide vehicle information to compute how specific weather constraints affect vehicle operations.
3. Provide operational information such as (a) possible mission profiles that include aircraft speed, horizontal route and altitude, (b) procedures for approach and departure, (c) procedures to access and exit controlled airspace (e.g., Class B), (d) representative vertiport locations and relevant operational parameters, and (e) Uber's proposed operational tempo.
4. Provide appropriate SMEs for NASA tests and evaluations of simulations.

ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities for this Annex defined in the "Responsibilities" Article are as follows:

Begin Task 1 (NASA)	1 month after Effective Date
End analysis for Task 1 (NASA)	4 months after Effective Date
Complete documentation for Task 1 (NASA)	6 months after Effective Date

Begin planning Task 2 (Joint)	1 month after Effective Date
Execute Task 2 activity (NASA)	6 months after Effective Date
Complete internal documentation of results for partner review for Task 2 (NASA)	12 months after Effective Date
Conduct planning for follow-on evaluation activity (Joint)	12 months after Effective Date
Participate in follow-on evaluation activity (Joint)	16 months after Effective Date
Complete internal documentation of results for partner review (Joint)	22 months after Effective Date
Conduct close out meeting and review of activity (Joint)	24 months after Effective Date

ARTICLE 4. FINANCIAL OBLIGATIONS

There will be no transfer of funds between the Parties under this Agreement and each Party will fund its own participation. All activities under or pursuant to this Agreement are subject to the availability of funds, and no provision of this Agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, (31 U.S.C. § 1341).

ARTICLE 5. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. Data produced under this Annex which is subject to paragraph C. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement will be protected for the period of two years.

B. Under paragraph H. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement, Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data provided.

1. Background Data:

TBD

2. Third Party Proprietary Data:

None.

3. Controlled Government Data:

None.

4. The following software and related Data will be provided to Partner under a separate Software Usage Agreement:

None.

ARTICLE 6. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect until the completion of all obligations of both Parties hereto, or two years from the Effective Date, whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. The term of this Annex shall not exceed the term of the Umbrella Agreement. The Annex automatically expires upon the expiration of the Umbrella Agreement.

ARTICLE 7. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Annex by providing thirty (30) calendar days written notice to the other Party.

ARTICLE 8. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Annex.

Management Points of Contact

NASA Ames Research Center
William Chan
Project Manager, ATM-X
MS 210-8
Moffett Field, CA
94035
Phone: 650-604-3295
William.Chan@nasa.gov

Uber Technologies Inc
Nikhil Goel
Product Manager
1455 Market St., Suite 400
San Francisco, CA 94103-1355
Phone: [redacted]
ngoel@uber.com

ARTICLE 9. MODIFICATIONS

Any modification to this Annex shall be executed, in writing, and signed by an authorized representative of NASA and the Partner. Modification of an Annex does not modify the terms of the Umbrella Agreement.

ARTICLE 10. SIGNATORY AUTHORITY

The signatories to this Annex covenant and warrant that they have authority to execute this Annex. By signing below, the undersigned agrees to the above terms and conditions.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AMES RESEARCH CENTER

BY: _____
Huy K. Tran
Director of Aeronautics

DATE: 5/4/2018

UBER TECHNOLOGIES INC

BY: _____
Name: Jeffrey A. Holden
Title: Chief Product Officer

DATE: 5/4/2018